



Scientific Center of Innovative Research

THE DEVELOPMENT OF INNOVATIONS AND FINANCIAL TECHNOLOGY IN THE DIGITAL ECONOMY

Monograph

2023

International databases and directories indexing publications:

- CrossRef (DOI: 10.36690);
- [Google Scholar](#);
- [National Library of Estonia](#);
- [The ESTER e-catalog](#);
- [PKP-Index](#)

The textbook is recommended for publication by the Scientific Committee of the OÜ Scientific Center of Innovative Research (protocol No. 4 dated May 31, 2023)

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ISBN 978-9916-9739-7-4

The development of innovations and financial technology in the digital economy: monograph. Pussi, Estonia. OÜ Scientific Center of Innovative Research. 2023. 230 p.

The monograph is the result of a multidisciplinary study of the problems of development of innovations and financial technology in the digital economy. In particular, the authors focused on the main definitions, structure and features of the digital economy. Particular attention was paid to innovations in the digital economy and digital competences, which are necessary for its development. Quite important attention of the authors of the study was focused on the development of financial technologies in the digital economy, including blockchain technologies. The main provisions of the study are focused on the formulation of new scientific hypotheses, methods and tools for the development of the digital economy. The publication is intended for scientists, civil servants, teachers and students of higher education institutions, practitioners, a wide range of readers who are interested in the problems of digital technologies and digital society.

ISBN 978-9916-9739-7-4

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DEVELOPMENT OF INNOVATIVE BUSINESS COMPANIES AND FINTECH INDUSTRY IN THE DIGITAL ECONOMY

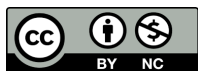
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Citation:

Rumyk, I. Melnichenko, I. (2023). Development of innovative business companies and fintech industry in the digital economy. *The development of innovations and financial technology in the digital economy*: monograph. OÜ Scientific Center of Innovative Research. 2023. 230 p. PP. 170-188, <https://doi.org/10.36690/DIFTDE-2023-170-188>



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Abstract. *The globalization of economic relations and the development of modern financial technologies require the search for new means of ensuring national interests, in the market of financial services. In these conditions, the question arises of forming a modern innovative financial system, taking into account the peculiarities both at the level of business structures and at the level of the state. In this system, the leading place as a modern means of service market development belongs to the latest financial services and tools, the implementation of which in all spheres of business activity demonstrates the importance of the development of the fintech industry. The defining trend in the development of the world economy in the 21st century was the spread of information and communication technologies, which made it possible to talk about the formation of the so-called "digital economy" and led to the introduction of the concepts of "digitalization" or "digitalization" into scientific circulation. The most extensive application of digital technologies was reflected in the financial sector, in particular, it made significant changes in the organization of circulation and trading of financial instruments. The transition to digital technologies in various fields of activity has been significantly accelerated by the COVID-19 pandemic, which has manifested itself in the sharp growth of e-commerce, increasing the pace of implementation of telemedicine, video conferencing, distance learning and financial technologies. Modern progress in the development of mobile money, financial and technological services of Internet banking can bring significant benefits to the population with low incomes and small businesses, which determines the relevance of research on the development of innovative business companies and the fintech industry in the digital economy. The purpose of the work is to study the essence of the digital economy, financial technologies; analysis of trends in the development of innovative business companies, as well as determination of the direction of influence of FinTech innovations on the development of business structures and the national economy as a whole. The main research methods were scientific abstraction, logical generalization, comparative and statistical analyzes, structural-functional and strategic analysis for substantiation and determination of directions of development of innovative companies. As a result of research, it will be established that the current stage of the development of society is determined by the formation of a new one type of economic system - digital economy, which is characterized the significant impact of information technologies on the rates of economic growth and to all spheres of the economic life of society. Traditional market participants respond to these changes by switching to innovative business models, which are an example digital and neobanks, as well as adaptation of FinTech innovations in traditional ones banking business models by creating their own FinTech units, development of partnership with FinTech companies and cooperation with other participant's market.*

Keywords. *innovative companies, FinTech, digital economy, business models, business structures, financial market participants.*

At the current stage of functioning of economic systems and society, business structures and financial companies are under the influence of digital technologies, the dynamic development of which has already led to changes in the management of most business processes and is one of the main factors of further economic transformation.

Informatization and digitization of public life covers all aspects of the functioning of the economy, therefore the transition to the digital economy should be taken into account in the management system of the national economy, and information and information and communication technologies should be considered as important components of ensuring economic growth and economic security.

The modern stage of society's development is determined by the formation of a new type of economic system - the information economy, which is characterized by the significant impact of information technologies on the rates of economic growth and on all spheres of the economic life of society.

In addition to traditional financial services that are implemented using information and communication technologies, it is worth paying attention to such a phenomenon in the financial sphere as the development of innovative financial technologies and relevant financial and technological startups that ensure that consumers receive a number of financial services online without the involvement of traditional financial intermediaries.

The defining trend in the development of the world economy in the 21st century was the spread of information and communication technologies, which made it possible to talk about the formation of the so-called "digital economy" and led to the introduction of the concepts of "digitalization" or "digitalization" into scientific circulation. The most extensive application of digital technologies was reflected in the financial sector, in particular, it made significant changes in the organization of circulation and trading of financial instruments.

Digitalization of the economy is considered a fundamental factor of economic growth, innovation and competitive environment, job creation and social progress in general [1]. The key factor of the digital economy is digital data, which allows to

multiply the volume of processed information, reduce the time for its analysis and significantly increase its efficiency for the production of technologies, goods and improving the quality of services.

Digitalization of the economy allows to achieve many positive social and economic effects. The main economic advantages of the digital economy include increasing the rate of economic growth, accelerating the development of small and medium-sized businesses, increasing the efficiency of business processes, and increasing employment in the information and technology industries. The social effects of the digitalization of the economy are: increasing the availability of financial services, reducing the cost of education due to its virtualization, improving the quality of medical care due to the digitalization of patient data, and reducing the negative impact on the environment.

Dynamic technological development and the increase in the possibilities of using information technologies in the market of financial services contributed to the development of the appropriate category apparatus. One of the most used in this context is the term "FinTech", which is used by various authors to denote FinTech innovations, FinTech services, FinTech companies, etc. The multifaceted nature and different content load of the use of the term "FinTech" has led to significant differences in the definition of this category in the scientific literature (Table 3.1).

So, the basis of classification of FinTech innovations in most scientific sources are their division according to the types of financial services they are transform: payments and transfers; services of infrastructure market participants; investment management; insurance; loans and savings; build-up capital However, FinTech innovations are not only changing individual financial products or processes, but also the financial services market as a whole, which is accompanied the appearance of new participants on it and the revision of business models of existing ones participants.

Despite the fact that there was an opportunity to develop the FinTech segment ensured by wide distribution and use of information and computer technologies, but they cannot be considered the only factor that gave rise to FinTech. Moreover, it is

worth noting that in the financial sphere manifestation of the use of technological innovations turned out to be one of the most significant, which signals the presence of additional stimulating factors spread of innovative technologies in the national financial sector economy. Therefore, it is urgent to carry out a detailed study of the complex factors that ensured the success of digitization in the financial sphere, and caused rapid development of FinTech innovations.

Table 3.1. The main approaches to the characterization of the essence of FinTech

Content of the approach	Author (source)	Definition of FinTech
FinTech as an innovation and business model	Financial Stability Board [2]	FinTech is a technology-enabled innovation in financial services that can lead to the emergence of new business models, applications, processes or products that have a significant impact on the provision of financial services.
	PwC [3]; Kovalenko V. [4]	The essence of FinTech should be defined by the relationship of two main components: innovations that are based on the technologies of the traditional banking sector; and new models of providing financial services.
FinTech as an industry	Pochenchuk H. [5]	Broadly speaking, FinTech refers to the area of the financial system of the economy that unites companies that use the latest developments to provide better financial services. In a narrower sense, FinTech is the companies themselves that belong to this industry.
FinTech as a technology	Mazaraki A., Volosovych S. [6]; Diakonova I., Pavlenko L., Kryklii O. [7]	FinTech is an innovative technology used by financial institutions, state administration bodies, trade organizations to meet the needs of consumers of financial, administrative services and goods in the context of the development of the consumer economy.
FinTech as a service	Semenog A., Tsyruyk S. [8]	FinTech are services provided by technology companies with the help of special software, and are focused on meeting the financial needs of customers, offering convenient, efficient, automatic and transparent online products compared to classic financial services.

One of the most common approaches is the interpretation of FinTech from the point of view of a variety of innovations, and in this aspect the concept of FinTech is closest to the concept of "financial innovations". It is worth noting that unlike FinTech, financial innovations are not always associated with the adaptation of

certain information technologies to the financial services market. FinTech innovations are always technological innovations. Technological innovations that ensured the development of FinTech include: distributed access technologies (blockchain), artificial intelligence, big data analytics (Big Data), application programming interfaces, cloud technologies, biometrics [5; 9].

FinTech innovations are mostly perceived as a positive phenomenon in the development of the national economy, because they create new opportunities for economic development, expand the involvement of households and the business sector in financial relations, and increase the range of services used by economic entities. However, from the point of view of traditional financial intermediaries, in particular banking institutions, FinTech innovations can be considered as disruptive technologies.

A technology can be defined as a "disruptive technology" if its use is fundamental to a particular disruptive innovation. The developer of the theory of disruptive innovation is Clayton Christensen. According to this theory, a disruptive innovation is an innovation that uses "technology" in management, marketing, and investment policies that transforms information, labor, capital, and material resources into products or services of greater value that become the primary purpose of the company and, as a result, fundamentally changes the established "rules of the game" in many industries. Thus, certain innovations can shake the position of existing products, companies or even entire industries [10].

For example, Amazon and Aliexpress changed the way we think about e-commerce, AirBnb created a more efficient and secure rental market, and Uber transformed the taxi industry.

In the FinTech banking sector, technologies lead to the destruction of traditional business models, established models of relations with consumers, lead to the disappearance of certain types of financial services due to their transfer to the digital plane or their complete replacement by services offered by FinTech companies.

FinTech companies ensure that consumers receive a number of financial services online without the involvement of traditional financial intermediaries. Such

FinTech companies, as a rule, are not subject to the regulatory influence of the current regulatory framework, in which the existence and functioning of this type of intermediaries was not foreseen. Even without replacing traditional financial intermediaries, FinTech companies pose a challenge to the traditional financial system and to traditional approaches to managing economic processes in the country - they change the structure of financial products, ways of ensuring their provision and receipt by the consumer.

Among the types of banking services that have suffered the most disruptive impact as a result of FinTech innovations, i.e. their providers are now mainly FinTech companies, we can first mention payments and transfers, as they belong to highly profitable areas and are easily amenable to digitalization. In addition, new business models (crowdfunding platforms, peer-to-peer lending platforms) appeared and spread in the financial sector, which radically changed the financial services market of many developed countries.

According to the Capgemini report, the following levels of disruptive influence of FinTech on financial services are highlighted [11]:

- high level: payments, personal finance management;
- medium: loans, investments;
- low: basic banking services.

The replacement or disappearance of certain services from the portfolio of banking institutions is caused not only by the emergence of FinTech companies as competitors to traditional banks, but also by the development of new technologies that are qualitatively superior to existing approaches in traditional banking.

An example of the implementation of such technologies is the increasing adaptation of big data processing technologies, the development of better methods of identification and quantification of risks, the implementation of algorithm-based investments and the proliferation of platforms for users used to analyze and optimize their investment portfolios [3].

The spread of blockchain technology and its application to improve various aspects of the functioning of the financial services market has become a significant

destroyer of traditional approaches to the financial sector. The first and main direction of influence of the blockchain was the development of cryptocurrencies such as Bitcoin, which radically changed payments and money transfers by eliminating intermediaries and developing "smart" contracts (smart contracts) [3].

Examples of blockchain as a disruptive technology in the capital market are the following [12]:

1) blockchain is used for tokenization of assets and contracts, which leads to the disappearance of the need for custodians and banking services: the underlying assets are uniquely identified and form a database with the assignment of ownership rights;

2) blockchain is a universal accounting tool: it creates a universal, real-time, automatically reconciled record of ownership and transactions, taking this function away from financial intermediaries;

3) blockchain ensures self-fulfillment of smart contracts (automatic settlement of financial obligations between counterparties), turns the terms of the agreement into a "financial code" and removes the functions of financial intermediaries in servicing trade agreements; 4) the blockchain is based on cryptography and is updated by consensus, it has no central point of failure; 5) blockchain ensures the distribution of accounting functions, eliminates the need for multiple reconciliations and promotes the equality of participants: participants mutually agree on updating the database, everyone works on a copy without connecting to a central source.

The development of the FinTech sector leads to the destruction of established approaches and business models in other segments of the financial services market as well due to the emergence of on-demand insurance, peer-to-peer lending and robo-advisory services. Among FinTech companies, there are those that have experience in developing financial proposals using blockchain and offer advanced analytical solutions and provide cyber security services [13].

Therefore, FinTech is a disruptive technology for the financial sector of the national economy, which leads to a fundamental change in business models, interaction with clients and financial services themselves. All traditional financial services segments are experiencing this impact.

Summing up the analysis of the essence of FinTech, the following key characteristics can be identified:

1) compared to conventional financial innovations, the result of FinTech innovations is not only innovative financial products and technologies (processes), but also new business models of financial intermediaries and market entities - FinTech companies;

2) FinTech refers to radical innovations ("disruptive technology"), significantly changes individual financial services and the market of financial services as a whole;

3) information technology, which is often also innovative, is a mandatory basic concept that forms the basis of FinTech innovation.

Financial technologies, an abbreviated version of fintech (English — "financial technology" and "FinTech", respectively) represent a relatively new branch of the world economy and in the economic literature, this term was introduced in the 1990s together with the emergence of the worldwide Internet. The study of scientific literature leads to the conclusion that there is no unambiguous interpretation of the concept of "financial technology" (Table 3.2).

Table 3.2. The essence of the concept of financial technologies

Author	Interpretation
Schueffel, P. [14]	This is a new financial industry that uses technology to improve financial operations
Papernyk, S. [15]	It is an industry consisting of technologies for banking, corporate finance, capital markets, financial analytics, payments and personal finance management, which also includes private investments and private venture investments
Semenog, A., Kryvych, Ya., Tsyrylyk, S. [16]	These are services provided by technology companies using special software and focusing on the financial needs of clients
Tarasyuk, M., Koscheev, O. [17]	These are technologies used in the financial industry

After the global financial crisis of 2008, banks of all countries were forced to adapt to the new world. Regulators have strengthened capital requirements for banks, introduced new risk management standards and stricter requirements for KYC (Know Your Customer) and AML (Anti Money Laundering) procedures.

At the same time, technologies and innovations developed rapidly (Figure 3.1).

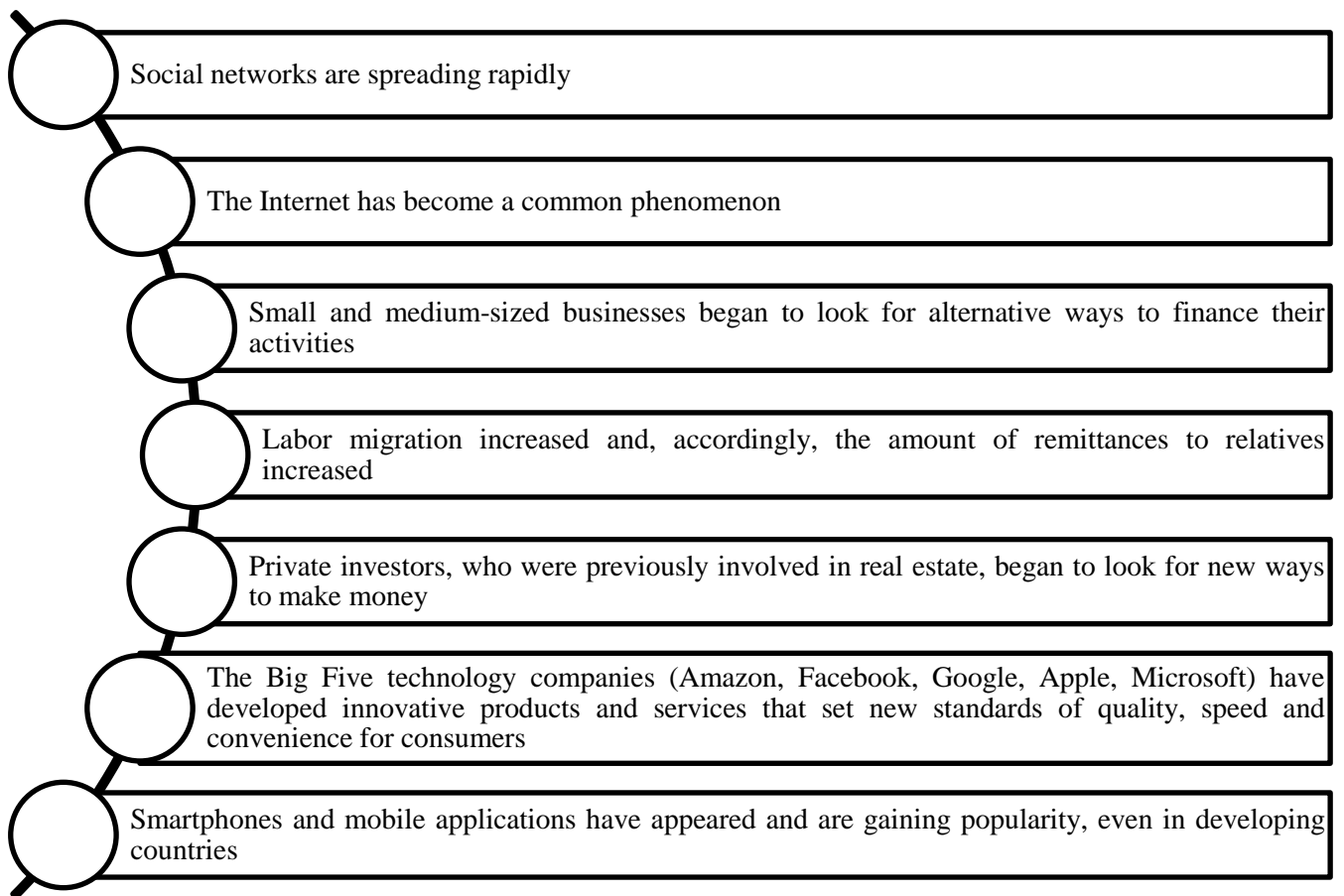


Figure 3.1. Characteristic features of the development of technologies and innovations [18]

With the emergence of new technologies, banks' focus on internal processes as a result of the 2008 crisis and the desire of users to experiment with digital services became the reasons for the emergence and growth of new FinTech companies.

The largest volume of investments was received by such sectors as: payments, lending and banking technologies. Other global trends include mobile financial services, financial and account management, money transfers, robot advisors, insurance technologies, crowdfunding, P2P lending, blockchain and cryptocurrencies.

Among FinTech companies, their own "Unicorns" have already appeared - companies worth more than 1 billion dollars. USA [19]. The main directions in which such startups are rapidly developing their business are (Figure 3.2) [18]:

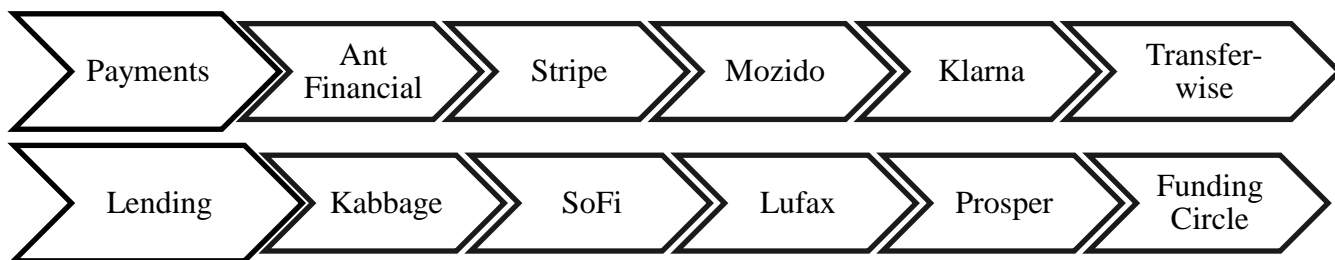


Figure 3.2. Examples of rapidly growing startups (cost more 1 billion dollars USA)

In Ukraine, FinTech is at a nascent stage and includes more than 60 companies of varying degrees of maturity. In fact, the largest FinTech example in the country was Privatbank (before nationalization), whose technological services were ahead of not only the local Ukrainian market, but also the European one. FinTech began to attract the attention of players in the financial sector of Ukraine only in 2017 after a number of events and forums dedicated to this topic.

After the financial crisis of 2008-2009, the first players among FinTech startups began to appear in Ukraine. For the most part, these projects were created in the direction of payments and transfers. The vast majority of all FinTech startups (58%) appeared since 2015.

The development of FinTech is actively supported by a number of various initiatives and measures of the National Bank of Ukraine. The National Bank of Ukraine envisages a number of initiatives (Figure 3.3).

The results of the study of Ukrainian innovative companies and business structures are as follows.

Startup founders. The founders are mostly individuals with experience in IT (65%) and finance (30%), most of whom are fluent in English. It is important to note that the top management of FinTech providers mainly consists of former bankers (70%) with experience in large commercial banks, including Privatbank, FUIB, Raiffeisen Bank Aval, Alfa-Bank and Universal Bank. About 23% of managers left the business and only 7% – from the IT sector (Figure 3.4).

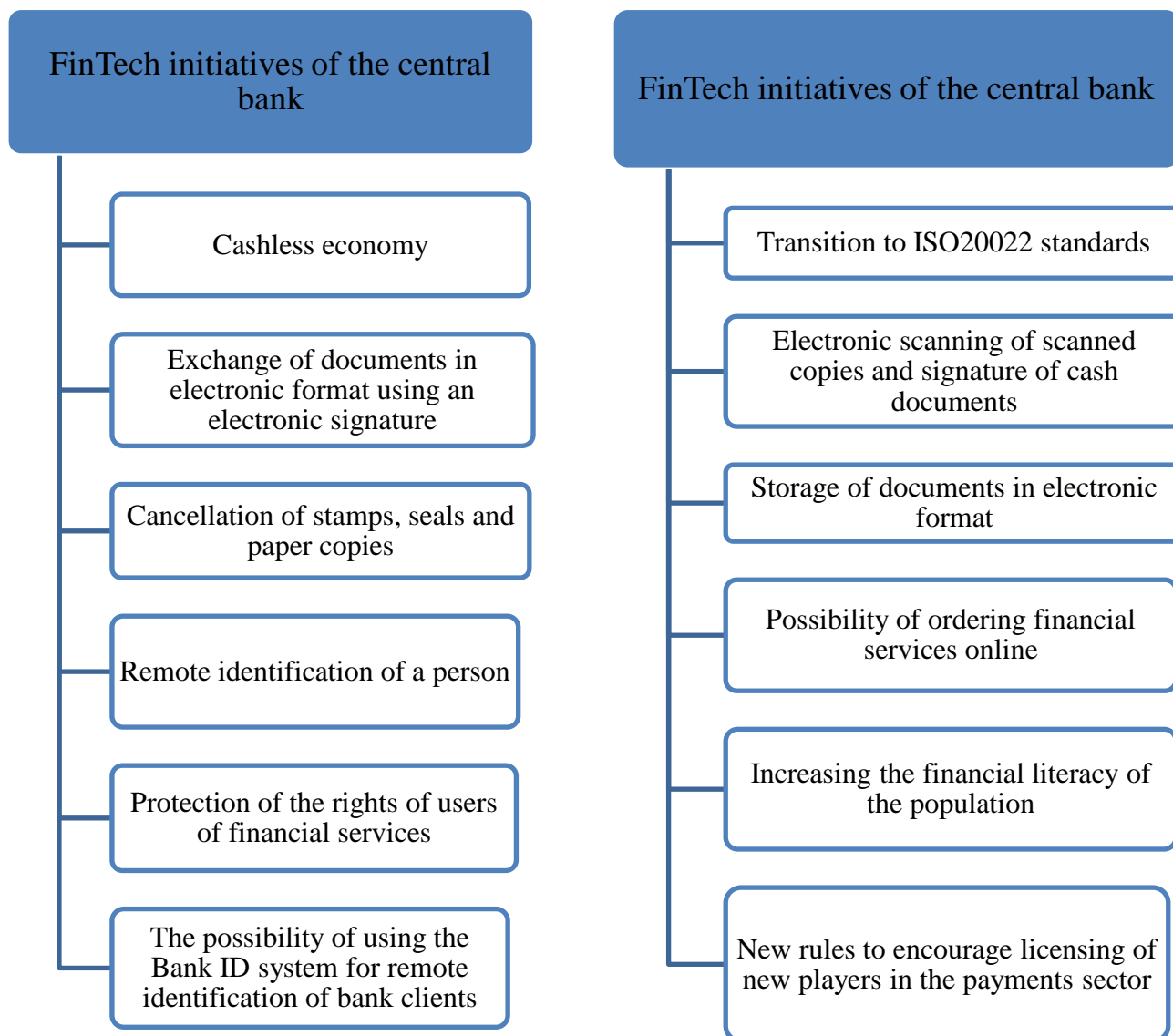


Figure 3.3. FinTech initiatives of the National Bank of Ukraine [18]

Among the important for the sector of non-financial corporations are traditional services financial intermediaries that have transformed under the influence of FinTech innovations, such as payments and settlements, lending current activity and investment. New financial technologies that are worth to take into account in entrepreneurial activity, there is a blockchain, the development of artificial intelligence, robo-consultants and big data analytics.

Division of the market into segments.

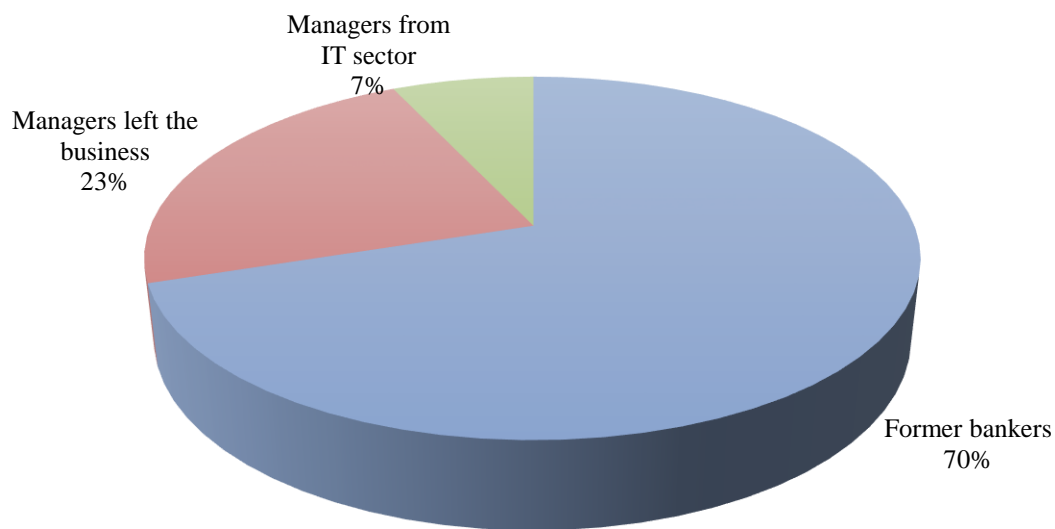


Figure 3.4. The top management of FinTech providers [18]

More than 37% of FinTech providers are engaged in the market segment of payments between legal entities (B2B) and are aimed at serving small and medium-sized enterprises (Figure 3.5):

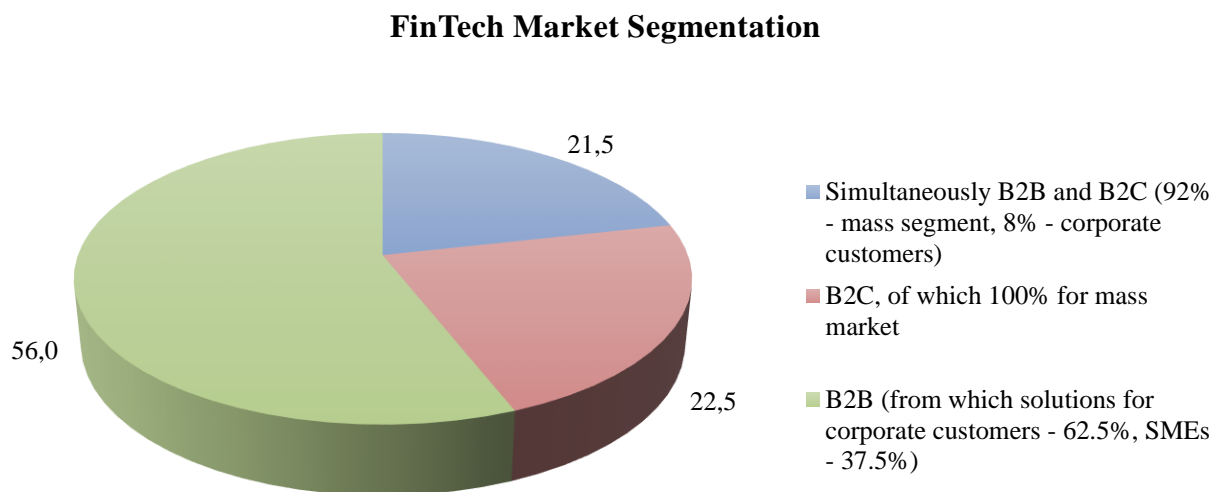


Figure 3.5. Market segmentation of financial innovations [18]

Thanks to the development of crowdfunding and peering (p2p, p2b) online platforms, the level of financial inclusion of business entities is increasing. For many

subjects of small and medium-sized businesses, as well as newly created one's enterprises that often could not count on receiving a sufficient amount of credit or acceptable financing conditions from traditional financial institutions intermediaries, crowdfunding platforms have become an alternative source investment financing, and peering platforms are an alternative source working capital financing [20].

When using crowdfunding and peering business entities take on additional risks with online platforms. Also, by posting information on a crowdfunding platform for receiving investments for an innovative project is the responsibility of the enterprise informational risk, because his innovative idea can be used by another entity.

Business models. From the point of view of business models, FinTech providers focus on receiving various commissions, although there are monthly subscription models. A small number of providers are based on a "freemium" model or a licensing model (Figure 3.6).

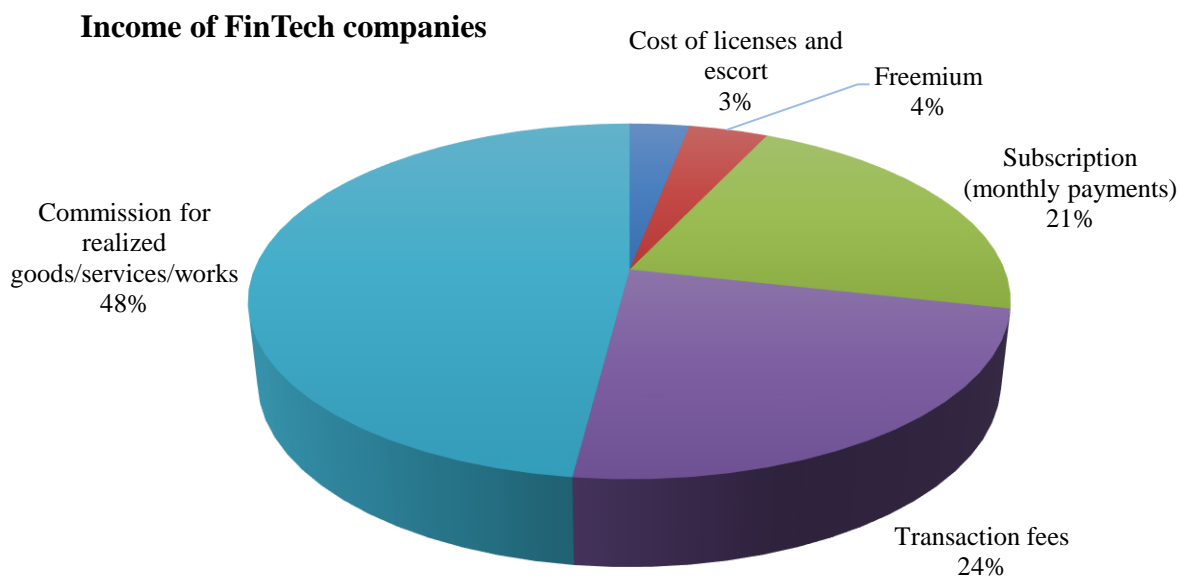


Figure 3.6. Sources of income of FinTech companies [18]

In the current activity of business entities, use is important financial services related to settlements with counterparties and receiving payments from consumers. Thanks to the emergence of mobile payments applications, online payment and

money transfer services, as well as development the cryptocurrency market, the operating conditions have been significantly simplified and improved electronic trade [21]. FinTech innovation has actually enabled businesses to serve online the full cycle of sales activities, including placement catalog, providing consultations, receiving an order, receiving payment. Using FinTech payment services allows for better management working capital of business entities, minimize receivables arrears.

Partnerships. Some of the FinTech providers support partnerships with banks and international payment systems. This includes platforms for P2P card transactions, payment cards with multiple company logos, and other payment services. Basically, these are banks such as FUIB, Oschadbank, Alfa-Bank, Raiffeisen Bank Aval, TASKOMBANK and international payment systems (Figure 3.7).

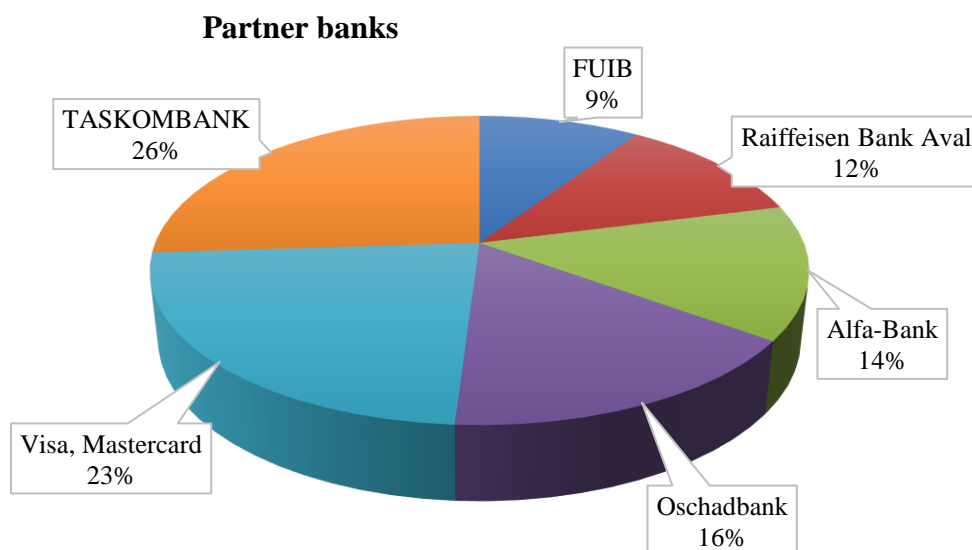


Figure 3.7. Main partner banks of FinTech companies [18]

In countries with a developed financial system, the distribution of credit resources between different categories of borrowers is balanced or close to such a state. In countries with a less developed financial system in distribution credit resources can be traced to two extremes. On the one hand, borrowers with a higher credit rating use credit services of banks, and banks, in turn, compete among

themselves for this category borrowers, offering them better credit terms. On the other hand, there is another group of borrowers with very low credit scores.

Borrowers from this group cannot get loans even if they are willing to accept a higher interest rate. In the category of borrowers from people who are employed often get a low credit rating unofficially, do not have a credit history and active deposits in the bank. These categories of borrowers represent a huge potential for development for peer-to-peer lending market, as they are not covered by banking lending.

Financing. Although many FinTech companies use their own funds to finance operations, a significant proportion (49%) seek funding from external investors (Figure 3.8).

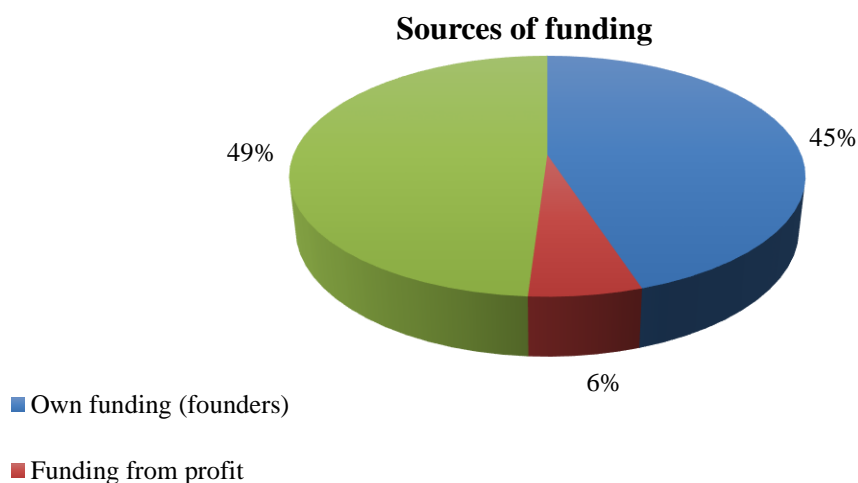


Figure 3.8. Sources of funding for FinTech companies [18]

As part of the survey, FinTech providers were asked about what topics they consider "hot" on the market. FinTech providers are among the "hot" topics identified the following: electronic banking, automation, biometric identification, machine learning and artificial intelligence (AI), forecasting and modeling, smart contracts, chat bots, blockchain, Big Data, digitization of all registers, ISO, IT security, cyber security and payment security, as well as an interest in open APIs.

Regarding topics that were "hot" but have become "cold" over the past year, FinTech providers noted electronic wallets, mobile applications, cash transactions, mobile technologies, payment cards and Internet acquiring (Table 3.3).

Table 3.3. "Hot" and "Cold" fintech topics [18]

"Hot" fintech topics		"Cold" fintech topics
electronic banking	automation	electronic wallets
biometric identification	machine learning	mobile apps
artificial intelligence (AI)	smart contracts	cash transactions
forecasting and modeling	chat bots	mobile technologies
blockchain & Big Data	payment security	payment cards
digitization of all registers	ISO & IT security	Internet acquiring
open APIs	cyber security	X

The FinTech sector was overlooked by financial authorities for a long time regulation and supervision, as the priority of regulatory influence was determined system forming banks and other financial intermediaries. From this point of view, they are separate financial innovation and FinTech companies were considered to be significantly unable influence the stability of the economic situation, and therefore do not need application of special regulatory measures ("too-small-to-care"). In fact, the development of the FinTech market in recent years has demonstrated exponential, not linear, growth, which became a real challenge for public administration sector.

In fact, at the current stage, the size of FinTech segment is so large that its decline or inefficiency is significant will affect the state of the entire financial system ("too-big-to-fail").

Challenges for the development of the FinTech market in Ukraine:

- Legislative and regulatory field;
- A traditional banking sector that is slow to innovate;
- Absence of open APIs in the banking system;
- FinTech providers' limited access to capital and funding.

To date, the methods of consideration and use by the state FinTech innovation in its activities includes three main areas: reactive regulation, RegTech and proactive regulation.

Reactive regulation involves legislative development and implementation regulatory influence of the state on the FinTech segment: in the public sector requirements for the functioning of new entities - FinTech - are being formed companies, to new types of FinTech services, conditions for the protection of rights are provided consumers, investors and other market participants.

The second direction is the use of FinTech in providing public services, ensuring the functioning of the public sector, proceedings regulatory and supervisory activities, in particular for carrying out financial monitoring, control of individual financial operations, national organization payment system, electronic tax administration, application electronic identification technologies. An important place in this direction is occupied by RegTech (or Regulatory Technology) - regulatory technologies that provide compliance of companies and organizations with new requirements of legislation and their compliance.

The third direction of using FinTech is this proactive regulation, i.e. application of individual FinTech tools for stimulation of the economy: for example, the use of peering or crowdfunding financing as an additional source of formation investment resources of enterprises and the creation of appropriate incentives for them operating conditions. Proactive norms that allow to form proposals for innovative business exist in a number of countries around the world: in particular, in USA, Great Britain, Hong Kong.

So, the current stage of development of the financial services market is characterized not only by the increase in the level of digitalization, but also by the technology of financial services, which is manifested in the intensive development of new information technologies and creating fundamentally new types of financial services based on them and tools. The biggest transformative impact of FinTech innovations is on the sector of financial corporations, from which it follows

intersectoral transmission of this influence on three other sectors of the national economy.

The conducted research allows us to make a number of important points conclusions:

1. Despite the fairly early stage of development of the FinTech industry in Ukraine, there is significant growth in the industry with the potential to continue this trend in the future.

2. A strong infrastructure in the form of high mobile and smartphone penetration combined with a well-educated and technologically literate population will help accelerate the development of FinTech.

3. Given the existing demand in the market, FinTech solutions that will be focused on financial inclusion and the mass market have the greatest potential for growth in the future.

4. The implementation of the "learn by testing" approach or the so-called "regulatory sandbox" will help the advancement of FinTech. And legislative and regulatory changes will "catch up" with this development.

5. Continuation of the harmonization of the legal field of Ukraine with the Directives of the European Union regarding electronic money, remote opening of accounts, multi-level identification of customers (KYC), PSD2, open ARIs and the use of third parties as agents may further contribute to the development of the FinTech industry in Ukraine.

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